

Danish S. S. *Virginia*:

Gale began on the 6th, wind SSW. Lowest barometer 29.09 inches at 11 a. m. on the 8th, wind W., 10, in latitude 56° 48' N., longitude 18° 38' W. End on the 9th, wind W. Highest force of wind 10; shifts W.-WSW.

British S. S. *Bloomfield*:

Gale began on the 7th, wind SW. Lowest barometer 29.61 inches at 11 a. m. on the 9th, wind W., 8, in latitude 48° 09' N., longitude 18° 17' W. End on the 10th, wind WNW. Highest force of wind 8; shifts SW.-W.-NW.

On the 9th a LOW appeared off the coasts of Nova Scotia and Maine; this moved rapidly northeastward, and on the 10th the center was near St. Johns, Newfoundland, while vessels between the 35th and 40th parallels and the 50th and 55th meridians encountered southerly to southwesterly gales. Storm log:

British S. S. *Bolton Castle*:

Gale began on the 10th, wind SW. Lowest barometer 29.97 inches at 2 p. m. on the 10th, wind SW., 8, in latitude 36° 50' N., longitude 54° 49' W. End on the 10th, wind W. Highest force of wind 8, SW.; steady SW.

From the 11th until the 21st summer conditions and light to moderate winds prevailed over the entire ocean, with the following exceptions: On the 12th and 13th there was a slight disturbance with moderate gales over a very limited area between the 55th and 40th parallels and the 55th and 60th meridians. Storm log:

American S. S. *West Haven*:

Gale began on the 12th, wind SSW. Lowest barometer 29.79 inches at noon on the 13th, wind S., 8, in latitude 39° 01' N., longitude 55° 04' W. End on the 13th, wind SW. Highest force of wind 9; shifts S.-SW.

On the 15th a westerly gale was reported by one vessel in the vicinity of the Bermudas. Storm log:

American S. S. *West Carmak*:

Gale began on the 15th, wind SW. Lowest barometer 29.90 inches at noon on the 15th, wind SW., 5, in latitude 33° 54' N., longitude 64° 13' W. End on the 15th, wind NW. Highest force of wind 8; shifts SW.-NW.

From the 22d to 28th the conditions over the western section of the ocean were most unusual for the summer season, as a deep depression remained in the vicinity of Newfoundland during that period, while the storm area varied in extent and intensity from day to day. Charts VIII to XI show the conditions from the 23d to 26th, inclusive.

The most severe weather of the month occurred on the 23d, when the western section of the ocean, north of the 35th parallel was covered by a severe cyclonic disturbance. Storm logs:

American S. S. *President Polk*:

Gale began on the 23d, wind NW. Lowest barometer 29.88 inches at 1 p. m. on the 23d, wind NW., 10, in latitude 40° 48' N., longitude 58° 22' W. End on the 23d, wind NW. Highest force of wind 10, NW.; steady NW.

The above gale was extremely freakish coming as it did with a high barometer and no usual sign. It made up a very heavy sea, the waves being as high as those seen during midwinter. Before things could be secured on board ship, some little damage was done by force of water coming on board.

British S. S. *Lackawanna*:

Gale began on the 22d, wind SE. Lowest barometer 29.03 inches at 3 a. m. on the 23d, wind SW., in latitude 41° 22' N., longitude 46° 34' W. End at noon on the 24th, wind WNW. Highest force of wind 11; shifts SE.-SSW.-WSW.

British S. S. *Norfolk Range*:

Gale began on the 22d, wind SE. Lowest barometer 29.63 inches at 9:23 a. m. on the 23d, wind S., 9, in latitude 47° 04' N., longitude 39° 13' W. End on the 25th, wind SSE. Highest force of wind 9; shifts S.-SSE.

On the 24th, as shown on Chart IX, the center of the disturbance had moved but little since the previous day, although the storm area had contracted considerably in extent, and was now practically confined to the eastern quadrants. On the 25th a secondary LOW appeared, Chart X, and heavy gales were reported from a limited area.

Japanese S. S. *Fukuyo Maru*:

Gale began on the 23d, wind SSE. Lowest barometer 29.42 inches at noon on the 25th, wind S., 9, in latitude 38° 47' N., longitude 42° 42' W. End on the 26th, wind WSW. Highest force of wind 10; shifts S.-W.

By the 26th, the relative position of the two LOWS had changed materially, as shown by Chart XI, and some vessels in the steamer lanes, between the 25th and 45th meridians encountered heavy weather, while a number of others in the same region reported only moderate winds. Storm log:

Belgian S. S. *Sunoco*:

Gale began on the 25th, wind SSE. Lowest barometer 29.43 inches at 5 p. m. on the 25th, wind SSE., 11, in latitude 43° 13' N., longitude 41° 23' W. End on the 26th, wind NNW. Highest force of wind 11; shifts SSE.-WSW.

From the 26th to 28th westerly to southerly gales were reported from the area between the Bermudas and Hatteras. Storm logs:

British S. S. *Parima*:

Gale began on the 26th, wind WSW. Lowest barometer 29.57 inches at 4 p. m. on the 27th, wind WNW., in latitude 36° 14' N., longitude 72° 35' W. End on the 27th. Highest force of wind 8; shifts WSW.-WNW.

American S. S. *E. L. Doheny III*:

Gale began on the 27th, wind WSW. Lowest barometer 29.54 inches at 6 a. m. on the 28th, wind S., 9, in latitude 32° 05' N., longitude 72° 15' W. End at 4 p. m. on the 28th, wind WSW. Highest force of wind 9, S; shifts WSW.-S.

On the 29th southerly to southwesterly gales prevailed over a limited area between the 37th and 42d parallels, and the 60th and 65th meridians.

NORTH PACIFIC OCEAN.

By WILLIS E. HURD.

June is usually associated with quiet conditions on the North Pacific Ocean. The typhoon is moderately infrequent, averaging only one or two annually in the month, and the gradient between the shallowing Aleutian LOW and the great high pressure area to the southward and southeastward is not particularly steep. In these respects June, 1923, was somewhat anomalous, for not only was there a far greater than normal number of typhoons formed in the Orient, but the Aleutian LOW was remarkably strong for the season. It persisted definitely until the third decade of the month, and during three or four days exhibited a depth comparable to that existing during the height of its winter activity, while it was attended by strong gales over a considerable expanse of ocean south of the Aleutian Islands. The North Pacific HIGH was fairly steady in its development and position throughout the month.

In the Hawaiian area quiet conditions prevailed. The trade wind was generally steady, and changes in pressure were of little importance. Only one disturbance appeared between the islands and the Californian mainland, and that was scarcely more than a mere depression which originated near latitude 35° N., longitude 135° W., on the 26th, and died out slightly to the northward on the

30th. At Honolulu the lowest pressure of the month occurred during this period, but the highest wind velocities were observed much earlier. The average hourly velocity for the month at this station was 10.8 miles, and the maximum reading was 30 miles from the northeast on the 11th. This was the driest June on record at Honolulu. Only 0.17 inch of rain fell, which was 0.75 inch below the normal.

The typhoons which occurred in the Far East during June have been fully discussed by the Rev. José Coronas, S. J., of the Manila Weather Bureau, in a paper which follows. It may be said, however, that in addition to the five typhoons he enumerates, there seems to have been a sixth which developed to the eastward of the Philippines about the 6th or 7th of the month. The American S. S. *Vinita*, eastward bound, on the 7th experienced a south wind of force 7, pressure 29.38 inches, in latitude 18° 08' N., longitude 130° 38' E. There was an accompaniment of heavy showers and high cross seas. The storm apparently first moved north-northwestward, then recurved and affected eastern Japan on the 9th and 10th. The highest reported force of the wind was 10 from the south, lowest pressure, 29.54 inches, observed by the American S. S. *West Jena* in latitude 36° 30' N., longitude 141° E., on the 10th. On the 11th the typhoon moved rapidly northeastward, gradually inclining more to the eastward, and on the 12th was approaching a moderate depression over the southern Aleutians. The union of the two storm areas was of considerable moment, and on the 12th, 13th, 14th, and part of the 15th a great region extending from about the 170th meridian of east longitude to nearly the 160th meridian of west longitude, was swept by gales of forces up to 10, with pressures in some instances well below 29.00 inches. The lowest reported pressure was 28.67 inches observed on board the British S. S. *Empress of Canada*, at 7 p. m. of the 13th, in latitude 50° 37' N., longitude 170° 26' W. The next lowest pressure, 28.82 inches, and the highest wind force, 10, SSW, were recorded by the American S. S. *Hanley* early on the morning of the 14th, in 50° 03' N., 170° 37' W.

Practically all observations of the storm during the last period were from north of the 45th parallel. The only gales reported from mid-ocean to the southward of this parallel were the following:

15th: By the American S. S. *Ethan Allen*, S. 7, in latitude 33° 50' N., longitude 172° 35' E.; lowest pressure, 29.72 inches.

18th: By same vessel, SSW. 10, in 37° 55' N., 170° 40' W., lowest pressure, 29.88.

19th: By American S. S. *President Cleveland*, SSW. 7, in 31° 07' N., 176° 04' E.; lowest pressure, 29.81.

On June 20 a storm from China left the mainland. It was central on the 21st near the mouth of the Yellow Sea, with a minimum pressure of about 29.06 inches. Thence it moved northeastward, and by the 24th and 25th was causing gales over the steamship routes lying immediately to the southward of the western Aleutians. This cyclone was of considerable depth, for although it lost some energy in crossing Japan, it more than recovered what it had lost after entering the open ocean. The Japanese S. S. *Hawaii Maru*, Yokohama toward Victoria, observed the lowest pressure, 28.84 inches, and the highest wind force, 8, SSW, near latitude 46° 41' N., longitude 169° 25' E.

Toward the end of the month another middle-latitudes cyclone disturbed the weather in Asiatic waters, and on the 28th and 29th strong gales were experienced on the Pacific coast of Japan and to the eastward.

Over the eastern half of the Pacific, aside from the gales previously mentioned, only two areas with storm winds have been noted. From the 4th to the 6th, north to northwest gales, force 7 to 9, were experienced by the American S. S. *Eldridge* and the British S. S. *Empress of Australia* between the 49th and 52d parallels of north latitude and the 160th and 170th meridians of west longitude. No further report of June gales in northern waters east of the 160th meridian has been received.

The other area is that of the North American Tropics. One or more disturbances off the west coasts of Mexico and Central America emphasize the need for seamen in these waters to observe storm indications closely.

The first disturbance noted occurred on the 16th and 17th. Mr. C. A. McMullen, 2d officer of the U. S. A. T. *Edgemoor*, makes the following note of it:

From Acapulco, Mexico, to Manzanilla Bay: Weather overcast, gloomy, with heavy rain squalls. Wind from a force of 4 increasing to force of 7, and shifting quickly from NE. to E., to SE. and *vice versa*. Heavy southwesterly swell. Rain squalls came up from direction opposite to that from which wind was blowing. This storm lasted throughout the passage, which time was 36 hours and 52 minutes. The lowest pressure (corrected) was 29.67 inches, in latitude 17° 37' N., longitude 103° 05' W.

This storm was also experienced on the 17th by the American S. S. *Cecil County*, San Pedro toward Balboa. Second Officer F. A. Davis remarks:

Steady NW. wind during early morning, shifting to E., force 6, at 5 a. m., and increasing to a gale, force 9-10, at 9 a. m., with lowest pressure 29.62 inches, in 18° 16' N., 104° 15' W. (D. R.). After 9 wind shifted gradually to S., moderating in force, though frequent squalls continued throughout the day.

On June 19, while in San Jose Harbor, the American S. S. *San Juan* encountered an east-southeasterly gale, force 7, lowest pressure 29.65 inches. A gale of force 7, accompanied by only a slight reduction in pressure, was observed on the 24th, in 14° 55' N., 94° 10' W., by the British S. S. *Margaret Coughlan*.

Pressure continued to average normal or below normal over the eastern part of the ocean, as shown by observations at the island stations, this being the fourth month with an absence of pressure above normal. As was the case in the preceding month the deficiency occurred at Dutch Harbor and Midway Island. The mean monthly deviation in pressure at the latter station in June during the past 12 years has been between 0.04 and 0.05 inch; this year it was -0.07. The average for the month (29 days) based on p. m. observations was 30.02 inches. The highest pressure, 30.16, occurred on the 3d; the lowest, 29.92, on the 19th, 20th, and 21st. Pressure at Dutch Harbor, based on p. m. observations, averaged 29.77 inches for the month (29 days) as compared with a normal of 29.92. The mean deviation at this station in June is about 0.13 inch. The highest pressure, 30.24, occurred on the 24th, the lowest, 28.90, on the 13th and 14th; absolute range 1.34 inches. The mean p. m. pressure at Honolulu was substantially normal at 30.04 inches. The highest pressure, 30.17, occurred on the 13th; the lowest, 29.90, on the 27th.

Fog during June was observed along the American coast region from 18° N. to Alaska, and over the entire width of the ocean along the northern routes. In the coast waters fog was reported as most frequent from the 35th parallel to the tip of Lower California, there being about 20 per cent of the days on which its occurrence was noted. Between the 180th meridian and Japan fog was encountered by trans-Pacific steamers on 65 per cent of the days.